PATENT ABSTRACTS OF JAPAN

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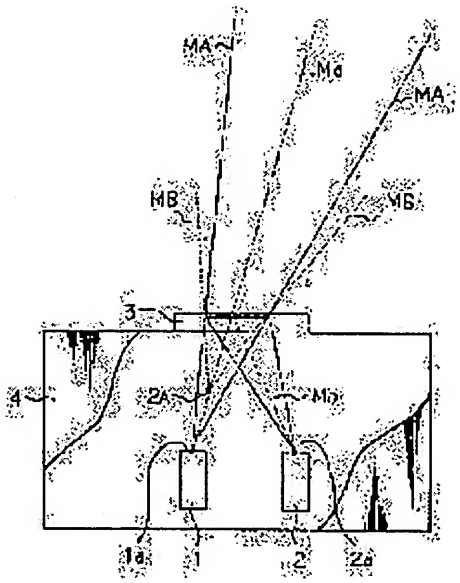
(54) SEMICONDUCTOR LASER DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a semiconductor laser device, which can simplify and miniaturize the device configuration in the case of using the plural laser beams of different wavelengths.

SOLUTION: The output laser beam of a semiconductor laser element 1 is transmitted through a diffraction grating 3 as it is and advanced along with an optical axis Ma. On the other hand, the output laser beam of a semiconductor laser element 2 is first advanced along with an optical axis Mb and made incident to the diffraction grating 3. The 1st-order laser beam diffracted by the diffraction grating 3 is advanced along with the optical axis Ma. On the assumption that this 1st-order diffracted light is the transmitted light of the diffraction grating 3, it can be regarded from the design condition of the diffraction grating 3 its light emitting point 2A is located on the optical axis Ma of the semiconductor laser element 1, and light emitting points 1a and 2a of the semiconductor laser elements 1 and 2 apparently exist on the same optical axis Ma. Therefore, an optical system can be constituted commonly for the respective wavelengths of the semiconductor laser elements 1, and 2.



LEGAL STATUS

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention starts the semiconductor laser equipment which outputs the laser beam of the wavelength from which plurality differs, for example, relates to amelioration of CD and the suitable semiconductor laser equipment for the optical pickup for DVD.
[0002]
[A background technique and Object of the Invention] Generally as the light source of the optical pickup in disk players, such as CD and DVD, the semiconductor laser component is used. Here, the object for CD differs in the luminescence wavelength of a laser component from the object for DVD, it is become to 780nm in CD-R, and it has become 650nm in DVD. In the DVD player of the first generation, since only the laser component whose luminescence wavelength is 650nm was incorporated, playback of CD-R was impossible. However, it is convenient if various kinds of disks, such as CD, CD-R, and DVD, are reproducible by one player. Then, in order to enable playback of those disks, the optical pickup which built in two waves of light sources, 650nm / 780nm, is considered.
[0003] The background technique of this two-wave laser equipment is shown in drawing 4 . First, what is shown in this drawing (A) constitutes each the object for CD, and for DVD separately, the laser component 902 and the optical system 904 for DVD which emit light on the wavelength of 650nm for DVD900 are established, and the laser component 912 and the optical system 914 for CD which emit light the wavelength of 780nm for CD910 are established. The optical path with this method from a laser component to [optical path] a disk has been independent with DVD and CD.
[0004] Although what is shown in drawing 4 (B) serves as a package with separate laser component 902 for DVD and laser component 912 for CD, those output laser beams are compounded with the wavelength filter (dichroic mirror) 920. Such technique is indicated by Sadao etc. Mizuno etc. "the optical head for accumulation mold DVD" (National Technical Report Vol.43 No.3 Jun.p.275 (1997)). By this approach, optical system 922 from the wavelength filter 920 to a disk 900,910 is common-use-ized with CD and DVD.
[0005] However, there are following un-arranging with such a background technique. (1) By the approach of drawing 4 (A), neither miniaturization nor reduction of components mark can be aimed at [that the pickup for the object for DVD and CD is only prepared only in juxtaposition, and]. (2) By the approach of drawing 4 (B), if it compares with (A), although a public area will increase, it cannot be said to be what may not necessarily be satisfied that newly need a wavelength filter, the number of components increases, and an equipment configuration is complicated etc.
[0006] This invention is what noted the above point, and sets it as the purpose to simplify the equipment configuration at the time of using the laser beam of the wavelength from which plurality differs, and to offer the semiconductor laser equipment which can attain the miniaturization.
[0007]
[Means for Solving the Problem] In order to attain said purpose, this invention is characterized by designing these diffraction gratings and a hologram component so that the point on the appearance of

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CLAIMS

[Claim(s)]
[Claim 1] These [1st] and the 2nd semiconductor laser component are incorporated. semiconductor laser component [of ** the 1st which outputs the laser beam of the 1st wavelength]; -- semiconductor laser component [of ** the 2nd which outputs the laser beam of the 2nd different wavelength]; -- It has case; by which the diffraction grating was prepared in those laser beam output sides. The point of said 1st semiconductor laser component emitting light, Semiconductor laser equipment with which the point on the appearance of the primary diffracted light of said 2nd semiconductor laser component by said diffraction grating emitting light is characterized by designing said diffraction grating so that it may be located on the same optical axis.
[Claim 2] These [1st] and the 2nd semiconductor laser component are incorporated. semiconductor laser component [of ** the 1st which outputs the laser beam of the 1st wavelength]; -- semiconductor laser component [of ** the 2nd which outputs the laser beam of the 2nd different wavelength]; -- It has case; by which the hologram component was prepared in those laser beam output sides. The point of said 1st semiconductor laser component emitting light, Semiconductor laser equipment with which the point on the appearance of the primary diffracted light of said 2nd semiconductor laser component by said hologram component emitting light is characterized by designing said hologram component so that it may be located on the same optical axis.
[Claim 3] These [1st] and the 2nd semiconductor laser component are incorporated. semiconductor laser component [of ** the 1st which outputs the laser beam of the 1st wavelength]; -- semiconductor laser component [of ** the 2nd which outputs the laser beam of the 2nd different wavelength]; -- It has case; by which the hologram component was prepared in those laser beam output sides. The point of said 1st semiconductor laser component emitting light, Semiconductor laser equipment characterized by designing said hologram component so that the point on the appearance of the primary diffracted light of said 2nd semiconductor laser component by said hologram component emitting light may turn into the same point.

[Translation done.]

two semiconductor laser components in a case emitting light may turn into the same point on the same optical axis, while incorporating in a case two semiconductor laser components from which oscillation wavelength differs, and diffraction gratings or hologram components.
[0008] The above and other purposes of this invention, the description, and an advantage will become clear from the following detailed explanation and an accompanying drawing.
[0009]
[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained to a detail. First, the 1st gestalt is explained with reference to drawing 1 and drawing 2 . The side elevation fractured in part is shown in drawing 1 , and the perspective view fractured in part is shown in drawing 2 . In these drawings, the 2nd semiconductor laser component 2 with the oscillation wavelength of a different proper from the 1st semiconductor laser component 1 and this laser component with the oscillation wavelength of a proper is contained in the case 4. The diffraction grating 3 is formed in the top face of a case 4.
[0010] Said semiconductor laser components 1 and 2 are arranged in the case 4 so that a laser beam may carry out incidence from the same side side of this diffraction grating 3. Ma shows 1a and an output optical axis, and MA shows the flux of light for the point of the semiconductor laser component 1 emitting light. Moreover, Mb shows 2a and an output optical axis, and MB shows the flux of light for the point of the semiconductor laser component 2 emitting light. A diffraction grating 3 diffracts the output laser beam of the semiconductor laser component 2, and it is designed so that the primary light may be outputted in the optical-axis Ma direction, while penetrating the output laser beam of the semiconductor laser component 1 as it is and outputting it. Namely, emitting light point 2A of the appearance when assuming the primary diffracted light of the semiconductor laser component 2 to be the zero-order transmitted light It is designed so that it may exist on the optical axis Ma of the semiconductor laser component 1.
[0011] Next, an operation of this gestalt is explained. If its attention is paid to the semiconductor laser component 1, the output laser beam will penetrate a diffraction grating 3 as it is, and will advance in accordance with an optical axis Ma. On the other hand, the output laser beam of the semiconductor laser component 2 advances in accordance with an optical axis Mb first, and carries out incidence to a diffraction grating 3. The primary laser beam diffracted by the diffraction grating 3 advances in accordance with an optical axis Ma, as mentioned above. Here, if this primary diffracted light is assumed to be the transmitted light of a diffraction grating 3, it can be considered from the design condition of a diffraction grating 3 that that emitting light point 2A is on the optical axis Ma of the semiconductor laser component 1.
[0012] For this reason, the points 1a and 2a of the semiconductor laser components 1 and 2 emitting light come to exist on the same optical axis Ma seemingly. Consequently, each wavelength can constitute the optical system from a diffraction grating 3 to a disk in common, the configuration can be simplified, and miniaturization and reduction of cost can be aimed at.
[0013] Next, other gestalten are explained, referring to drawing 3 . With this gestalt, a hologram component is used instead of a diffraction grating. In this drawing, the 2nd semiconductor laser component 6 with the oscillation wavelength of a different proper from the 1st semiconductor laser component 5 and this laser component with the oscillation wavelength of a proper is contained in the case 8. The hologram component 7 is formed in the top face of a case 8.
[0014] Said semiconductor laser components 5 and 6 are arranged in the case 8 so that a laser beam may carry out incidence from the same side side of this hologram component 7. Na shows 5a and an output optical axis, and NA shows the flux of light for the point of the semiconductor laser component 5 emitting light. Moreover, Nb shows 6a and an output optical axis, and NB shows the flux of light for the point of the semiconductor laser component 6 emitting light. The hologram component 7 diffracts the output laser beam of the semiconductor laser component 6, and it is designed so that the primary light may be outputted in the direction of optical-axis Na, while penetrating the output laser beam of the semiconductor laser component 5 as it is and outputting it. That is, the point of the appearance when assuming the primary diffracted light of the semiconductor laser component 6 to be the transmitted light

emitting light is designed so that it may exist on the optical axis Na of the semiconductor laser component 5.

[0015] Next, an operation of this gestalt is explained. First, the point of the semiconductor laser component 6 emitting light shall be designed by the hologram component 7 so that it may exist seemingly in six A1 on the optical axis Na of the semiconductor laser component 5. If its attention is paid to the semiconductor laser component 5, the output laser beam will penetrate the hologram component 7 as it is, and will advance in accordance with an optical axis Na. On the other hand, the output laser beam of the semiconductor laser component 6 advances in accordance with an optical axis Nb first, and carries out incidence to the hologram component 7. The primary laser beam diffracted with the hologram component 7 advances in accordance with an optical axis Na, as mentioned above. NB1 comes to show the flux of light.

[0016] Here, if this primary diffracted light is assumed to be the transmitted light of the hologram component 7, it can be considered from the design condition of the hologram component 7 that that point six A1 emitting light is on the optical axis Na of the semiconductor laser component 6. For this reason, the points 5a and 6a of the semiconductor laser components 5 and 6 emitting light come to exist on the same optical axis Na seemingly. Consequently, each wavelength can constitute the optical system from the hologram component 7 to a disk in common, the configuration can be simplified, and miniaturization and reduction of cost can be aimed at. The above operation is the same as that of the gestalt of said drawing 1 almost.

[0017] Next, the point of the semiconductor laser component 6 emitting light shall be designed by the hologram component 7 so that it may exist in the six A2 same points as emitting light point 5a of the semiconductor laser component 5 seemingly. In this case, although the primary laser beam of the semiconductor laser component 6 advances in accordance with an optical axis Na by the hologram component 7, NB2 comes to show that flux of light. If this primary diffracted light is assumed to be the transmitted light of the hologram component 7, it can be considered from the design condition of the hologram component 7 that that point six A2 emitting light is the same as that of emitting light point 5a of the semiconductor laser component 5. Also in this case, the same effectiveness can be acquired.

[0018] In addition, if the case where it is the case where the point on the appearance of the semiconductor laser component 6 emitting light is six A1, and six A2 is compared and the point emitting light will be set to the six A2 [same], the breadth of the flux of light of the semiconductor laser components 5 and 6 will become almost the same. Therefore, the same optical-path design is attained to the laser beam of two different wavelength. On the other hand, in the compatible regeneration system of DVD and CD, the technique (the so-called finite length amendment method) of canceling the aberration resulting from the difference of disk thickness by shifting the location of the point emitting light intentionally in the direction of an optical axis is proposed. It is more advantageous to set the point on the appearance of the semiconductor laser component 6 emitting light to six A1, when adopting this method.

[0019] It is possible for there to be many operation gestalten in this invention, and to change to Oshi based on the above indication. For example, although DVD, CD, and compatible playback of CD-R are one of the suitable examples of application, generally this invention is applicable, if it is the case where two or more laser beams from which wavelength differs are obtained.

[0020]

[Effect of the Invention] As explained above, while incorporating in a case two or more semiconductor laser component when oscillation wavelength differs, and a diffraction grating or a hologram component according to this invention So that the point on the appearance of the semiconductor laser component in a case emitting light may turn into the same point on the same optical axis, since these diffraction gratings and a hologram component are designed The configuration of optical system can be simplified, and it can be simplified and is effective in becoming possible to attain a miniaturization and low-cost-izing of a player etc. further.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the outline block diagram of the semiconductor laser equipment using the diffraction grating which shows one gestalt of this invention.
[Drawing 2] It is the perspective view of an outline showing the appearance of the semiconductor laser equipment of the gestalt of drawing 1 .
[Drawing 3] It is the outline block diagram of the semiconductor laser equipment using the hologram component which shows other gestalten of this invention.
[Drawing 4] It is drawing showing a background technique.
[Description of Notations]
1, 2, 5, 6 -- Semiconductor laser component
1a, 2a, 5a, 5b -- Point emitting light
2A, six A1, six A2 -- It is the point of ** emitting light seemingly.
3 -- Diffraction grating
4 8 -- Case
7 -- Hologram component
Ma, Mb, Na, Nb -- Optical axis
MA, MB, NA, NB1, NB2 -- Flux of light

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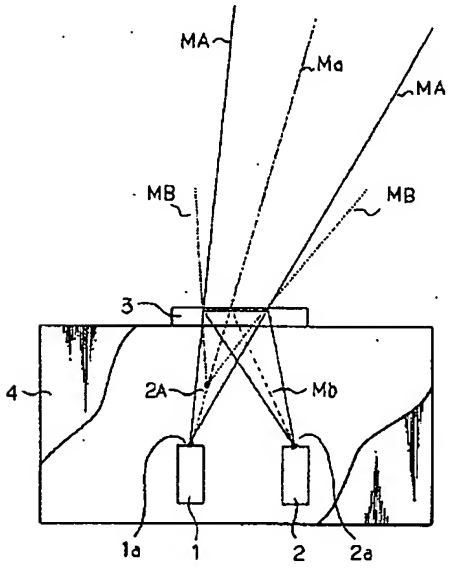
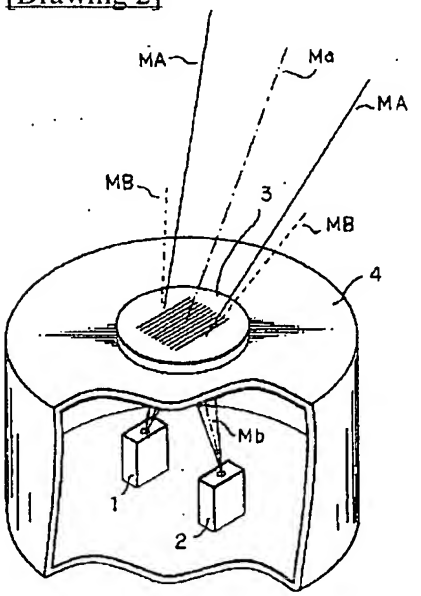
DRAWINGS

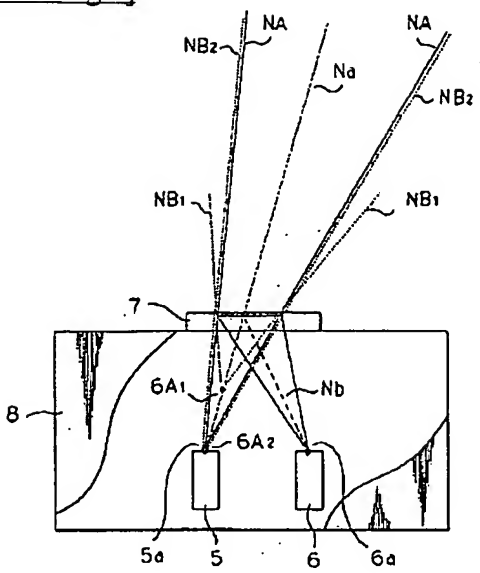
[Drawing 1]



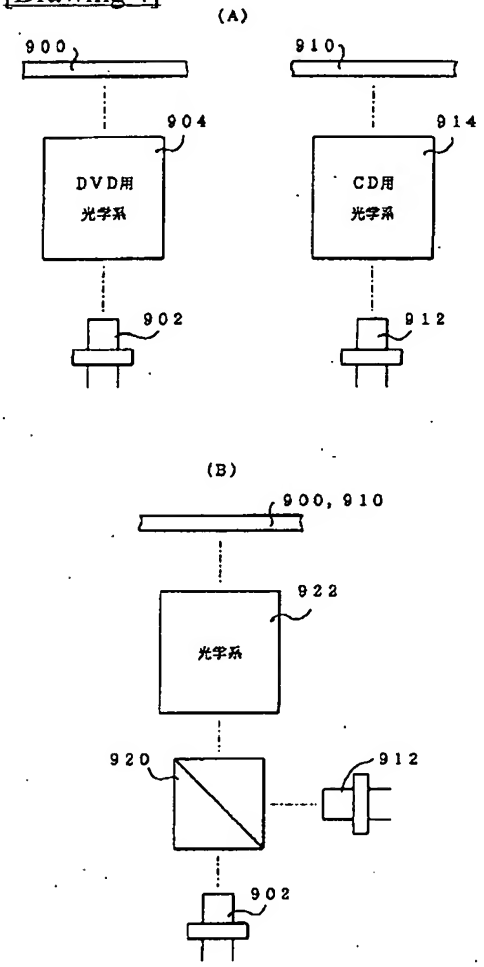
[Drawing 2]



[Drawing 3]



[Drawing 4]



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